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EXPERIENCES WITH FROZEN SERVICES, MAINS AND METERS DURING THE WINTER OF 1917-18, ROCHESTER, N. Y.[1]

By Beekman C. Little[2]

There used to be an annual joke, appearing about the middle of January when the weather was the coldest, to the effect that now the poet was deep in his work of writing up the beauties of spring. The author finds the converse of this is just as big a joke, that is, in this beautiful month of May, to write about the horrors water works men went through during the winter of 1917–1918. Although warned by the censor against the accumulation of a lot of statistics, it will be necessary to use some figures in order to bring out more clearly the conditions with which Rochester had to cope.

The city of Rochester has a population of approximately 255,000 persons who use the city water, and on January 1, 1918, it had over 49,000 meters. Being over 99 per cent metered this means in round numbers 50,000 active water services. While the water department was in the thick of the battle against the calamity of frozen pipes, it seemed at times as if the whole 50,000 wanted thawing at once, but now that there has been time to go over the figures, it has been found that during the entire winter, less than 3 per cent of the meters were damaged by frost, and less than 1 per cent of the services were frozen or, in other words there were some 1,400 meters to repair and some 375 services to thaw. The last frozen service was thawed out on April 30, when frost was still in the ground.

It is understood that in speaking of frozen services reference is made only to that portion of the pipes outside of the building or residence. There were naturally innumerable cases where plumbers were called in to thaw frozen pipes in cellars, basements, garages, barns, etc., but these are not considered in this paper. All told there were about three times as many frozen meters as in an ordinary year and many times the usual number of frozen services. In the hard winter of 1911–12 there was the nearest approach to the recent difficulty, there being about 200 frozen services at that time.

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[1] Read at the St. Louis Convention, May, 1918, and referred to the Committee on Cold Weather Troubles. Discussion is desired and should be sent to the Editor.

[2] Superintendent Water Works, Rochester, N. Y.

The heaviest day's business this winter (1917–1918) came on February 7, when 55 services were reported frozen. This big day followed very closely the coldest day of the winter, which occurred on February 5, when the thermometer reached −11°.

The services, and very generally the mains, in Rochester, are laid at a depth of 4½ feet, that is, 4½ feet over the top of the pipe, which is evidently not deep enough in a winter as severe as this one just passed, for in many places the frost was found to have penetrated 5 feet or even deeper. However, as such severe continued cold weather apparently occurs at very long intervals, there has been no disposition on the part of those in charge of the water works management to increase the depth at which the water pipes should be laid.

The great majority of the frozen services in Rochester were thawed by the local Railway and Light Company, which charged for each service separately, based on the time and labor involved. An arrangement was made whereby the house owner signed an application in the water office, agreeing to pay the expense of thawing out his frozen service. The Railway and Light Company was notified of the applications as rapidly as possible and in the order in which they were received and they were taken care of in this same order, although preference was given in cases where illness prevailed. After doing the work, the light company would send a bill to the Water Department for work, say, in thawing John Smith's service at 100 Jones Street on February 1, $5.40. The Water Department would then send out this bill and collect the amount from John Smith, the property owner who had signed the original application.

In some cases, where obviously the freezing had taken place in the street, that is, between the curb and the main, the owner was not obliged to pay, as the Rochester water works rules state that the Water Bureau shall maintain the service from the main up to and including the curb-cock.

The average charge made by the Railway and Light Company was $5.40, the smallest charge being $2.25 and the highest $39.00, except in one case of a long line of wrought iron pipe laid for a contractor on Barge Canal work. There was no electric current near this pipe and quite a long line of wire had to be laid; in this case the charge was $139.00.

From one to eight gangs at a time were used for thawing, depending on the demands for their services, and even eight gangs were not enough some days. An outfit consisted of three men from the Lighting Company with their wire and transformer, which weighed perhaps 700 pounds, and two men (one plumber and one chauffeur) from the Water Bureau, and a water works light automobile truck, on which the wire, transformer and men were carried. Although not charged against the property owner, the Water Bureau's expense connected with the thawing averaged $2.10 per service, which added to the charge of the Railway and Light Company, made the entire expense $7.50 per service.

Both direct and alternating current were used at different times in certain localities, as the old Edison lighting system is used to a certain extent in the central part of the city, and when this was available direct current could be used. In the direct-current system, after the connection to the wires of the lighting system were made, just one connection was made to the water service inside the basement or cellar. When alternating current was used, an additional connection would be made, generally to the nearest hydrant or occasionally to a curb-cock outside the premises. The actual thawing took less than a minute in some cases and in the extreme case mentioned before, when a charge of $139.00 was made, 2½ hours expired after the current was turned on before the water started.

About 25 of the frozen services were thawed by the Water Bureau's repair force, by means of a steam jet. The men used a small gasoline boiler of the porcupine type, which was carried around on an automobile truck. This boiler weighs perhaps 75 pounds and was light enough to be carried into a cellar. When the water pipe was disconnected at the meter, a jet of steam at a pressure of about 70 pounds would be forced into the pipe toward the street main through a ¼-inch flexible block-tin pipe. The time required for thawing would depend, of course, on the length of pipe frozen.

In thawing out such hydrants as might be found frozen, a somewhat larger kerosine boiler (called the Acme Safety, a sectional boiler having five sections or drums) was used, and a larger jet of steam was applied through a rubber hose. In case the hydrant *branch* was frozen, the hydrant would be removed and this same large steam jet applied directly to the branch.

Very few hydrants were frozen as men were kept constantly at work inspecting them. Although there were no large fires, there was not one case, at any fire which did occur, of a hydrant being found inoperative. In perhaps 7 or 8 cases where the men found the hydrant branch itself freezing or frozen up, the branch was thawed and then a bleeder was attached to one nozzle of the hydrant and the water allowed to run constantly into the nearest surface sewer lateral.

Only one main was frozen. This was a 6-inch line about 400 feet long, with no services from it and no connections, and consequently no circulation. It was thawed by electricity without particular difficulty.

The Water Bureau discovered and thawed out seven 6-inch services feeding automatic sprinkler systems, and the condition of these led to a rather disquieting thought, that possibly there were a number of these sprinkling systems, or exclusively fire line services, which might be frozen or partly frozen and this dangerous condition not be discovered until the fire system was needed for duty, when of course it would fail. A regular water service, being used almost constantly, at least during business hours, indicates at once by its failure to furnish water that something is wrong, but with the fire services the conditions are different and such a service might remain frozen quite a time before this was discovered. Even opening a bleeder to see if the water would run on such a system would not insure its perfect condition.

In one case it was necessary to take out a 6-inch Detector meter which had cracked from the water freezing and expanding; the water was spurting out all over the basement floor. The main was shut off at the operating gate in the street and when the meter was taken out, it was found that although the service was a 6-inch cast iron pipe, its capacity had been reduced to that of a 2-inch or less by the ice that had formed inside. The ice had evidently begun to form at the circumference and had frozen in toward the center. Another year, if one occurs, which Heaven forbid, when the frost penetrates as deep as it did this past winter, this danger to fire services should be kept in mind by the water works superintendent. A small stream of water left running continually, if started before any ice had formed, would possibly keep the pipe entirely clear of any ice formation.

This letting water run to prevent freezing is of course theoretically a very wrong thing to do. Our mains should be laid deep enough, our pipes and plumbing so planned, and our cellars and basements kept warm enough, to make freezing impossible. This winter, however, was exceptional not alone in its severity but also because of the fact that coal was scarce and very high in price. This difficulty in getting coal caused many people to give up partially or even entirely heating their cellars. This, together with a temperature, as recorded by the Weather Bureau for January, averaging for each day, over 9° colder than normal, and fixing the month as the coldest in the forty-year history of the Weather Bureau, made a combination which upset many rules not made to meet such extraordinary conditions. Consequently, for the first time in Rochester, but only in cases where a service had once frozen, the owner was told to let the water run constantly, and in many cases the Water Bureau cut a notch in a washer in some faucet to be sure that the water would not be shut off.

In case a meter was frozen, the Water Bureau removed the meter and inserted a filling-in section of pipe and did not replace the meter until all danger of freezing was over. In these cases, as long as there was no meter to record the waste of water, the occupant hardly had to be told that he could let the water run. The Bureau averaged the bills in each case on the basis of former consumption. The fact that actually only a small percentage of the entire number of meters and services was affected, made only a slight increase over the normal consumption. Had the severe weather continued much longer, however (for we were beginning to feel a little panicky) a general notice would have been published in the papers requesting *all* users to let the water run continually and this of course would have sent our consumption curve away up.

The normal daily per capita consumption is close to 100 gallons and on the coldest day, which coincided with the heaviest consumption, only 125 gallons per capita was registered. Through the entire month of February, the consumption averaged only a little over 104 gallons per capita per day.

There is not a great deal more of special interest to tell. The Water Bureau repaired and reset practically all of the 1400 frozen meters. Beginning to reset about the middle of March, 43 meters were replaced daily for thirty-one days. On one day 90 meters were replaced, using six light automobiles, with two men to each car.

This record was really broken, however, on one day when with four rigs and eight men 83 meters were replaced. In addition to replacing all these meters during the month, this same force of men removed in the same period, an average of 17 meters a day. The average labor cost of removing and resetting a meter was[3] $1.14. The average labor cost of repairing was $1.34 per meter and the cost of materials for repairing,[4] 71 cents per meter. These figures give an average cost for taking out a meter, repairing it and setting it back, of $3.19.

It was not possible at all times, of course, to keep up with the complaints, but by working Sundays and even some nights, the men prevented the work piling up too far ahead of them, and a tactful interview by a reporter now and then, in which the Bureau explained to the public its experiences and difficulties, helped very materially to lighten the worries.

[3] 1429 removed, 1503 repaired, or an average of 1466, cost $1,674.04 in February, March and up to April 15.

[4] 1187 meters repaired, labor equaled $1,589.71, repair materials for 1551 meters cost $1,101.58.